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the only practical and efficient method of dealing with this pest is the old one of grubbing out the affected plants as soon as they are noticed. It would be well, also, to discard those varieties known to be subject to the trouble.

EXPLANATION OF PLATE.

BLACKBERRY RUST (*Cæoma nitens*, Schw.).

Fig. 1. Section through portion of leaf affected with rust; *a a*, ruptured epidermis showing below at *b* the mass of spores; *c c*, haustoria. By means of these the fungus draws its nourishment from the cells. X 100. Newcombe.

Fig. 2. Part of section more highly magnified; *m m m*, mycelium surrounding cells of the host; *h h*, haustoria projecting within the cells. X 300. Newcombe.

Fig. 3. Spores. X 600. Newcombe.

Fig. 4. Section through spermogonium. X 300. Newcombe.

Fig. 5. Spores germinating; 24 hours in water. X 250. Galloway.

Fig. 6. Spore germinating; 60 hours in water. X 300. Galloway.

Fig. 7. Section through piece of old underground stem, showing perennial mycelium and haustoria. X 300. Newcombe.

FIELD NOTES—1890.

By ERWIN F. SMITH.

The field naturalist often discovers interesting phenomena not immediately related to his own work—phenomena too fragmentary to be worked up separately, and yet sometimes of much value to others if accurately observed and duly recorded. Such must be my apology for the greater part of the following "notes by the way."

PEACH LEAF CURL.*

Heretofore, in this country, California orchards are the only ones that have been seriously affected by this widely distributed fungus. This spring, however, it caused great injury in certain districts east of the Mississippi River, and was more than usually prevalent in all the principal peach regions of the eastern United States. It was most destructive in central Michigan and western New York, defoliating trees by the thousand in both localities. By the last of June the fungus had nearly disappeared, and the trees had partially recovered and were clothed with a second crop of leaves. But even in July the effects were plainly visible in enfeebled growths, yellowish foliage, and stunted fruits. Certain varieties suffered much worse than others, *e. g.*, Crawford's Early. It seemed to me it would take some of the trees several years to recover.

In Delaware and peninsular Maryland the fungus was unusually common, but the orchards were not defoliated nor badly attacked. I also observed traces of the disease in Georgia in midsummer, but it did not appear to have attracted attention or caused serious injury.

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* *Taphrina deformans*, Tul.

During 1887, 1888, and 1889, this fungus was rare in the great peach region between the Chesapeake and Delaware Bays. Often weeks passed without my seeing a single affected leaf, although I spent much of my time in the orchards. This struck me the more forcibly because in Michigan I had formerly observed the curl to be common every spring. This season, on the contrary, it could be collected in any peninsular orchard. In one only, however, did I find it serious. This was an old, abandoned orchard in sod ground, pastured. Here in May nearly every leaf was white, thick, and distorted, and many were falling. At a distance the foliage was not green, but yellowish white. Younger cultivated orchards on the same farm were nearly free.

PLUM TAPHRINA.

In Maryland and Georgia this disease was also very prevalent on *Prunus Chicasa* and its cultivated varieties. I have been accustomed to call this fungus *T. pruni*, but the injuries differ somewhat from those I have seen on *Prunus Americana* in the North and West. This fungus is much more inclined to thicken, distort, and unite the leaves and growing shoots. The "plum pockets" are also absent. The fruits often suffer, but the fungus generally attacks only one side, forming a hard, solid spot, which ripens imperfectly. From what I saw in the plum orchards of Georgia, and was told, this fungus is an enemy of some importance in that region. Is it specifically distinct from the pocket forming sort?

PLUM BLIGHT.

A peculiar disease, now prevalent several years, in a large plum orchard of native sorts at Griffin, Ga., deserves further study. This disease destroys large branches or whole trees in midsummer in the course of a few weeks. I saw many fine trees of bearing age entirely ruined. The foliage was drying up as if scorched, or as if the limb or body had been girdled. No fungous or insect enemies were observed, and there were no mechanical injuries. The surface bark on the trunk and base of the main limbs was smooth, unbroken, and usually normal in appearance, but upon cutting into it I always found large dead patches which sometimes entirely girdled the trunk or branch. These were often several inches wide by 1 or 2 feet long. Evidently the sudden drying and death of the remoter parts is due to interference in the circulation brought about by the presence of these bark injuries. Their origin, however, is still a mystery. There did not appear to be any injuries below ground. Indeed the injured trees usually sprout again vigorously from the earth.

The loss this year in an orchard of about 6,000 bearing trees amounted to more than 5 per cent. The owner said 10 per cent. The loss last year was nearly as great.

APPLE BLIGHT.*

Never before have I seen this disease one tenth part as destructive. In middle and north Georgia the apple trees were badly spotted by it. The injury was not confined to twigs, but affected branches of several years' growth, greatly injuring next year's fruit prospect. The disease was also common in Pennsylvania, where in other years I have found it common, although confined principally to the twigs. In Michigan it was not seen. In Kansas it was worse even than in Georgia. At Manhattan I was shown several young and thrifty orchards of bearing age which had been sadly injured. The attack began in 1889 and continued this year with increasing severity. The disease was not confined to twigs, but often destroyed large limbs and in some cases one-half or even the whole of the tree, as in pear blight. The owner was in despair. Certain varieties were noticeably worse injured than others. This was found to be true for different orchards and both years. Certain sorts escaped almost entirely.

PEAR-LEAF BLIGHT.†

In Dr. W. S. Maxwell's orchards the Lawrence and Bartlett pears in *sod* ground were very slightly attacked. They held their foliage practically intact until October 15. The cultivated trees were badly affected and shed their foliage early, except Keifer, which did not suffer. I observed this fungus at Still Pond, Md., in 1887, in these same orchards and elsewhere, and also in other parts of the peninsula, but it was not destructive and was not then considered of any consequence by any of the pear growers. Now they are all talking about it.

This year quince and pear orchards all over the Delaware and Chesapeake peninsula were seriously defoliated, and, as a consequence, were quite commonly in second leafage and blossom in October. The injury last year was also very great, amounting in some large orchards to an almost total loss of the crop.

BLACK ROT.‡

In Georgia and Kansas the summer was hot and dry. Vineyards in both States ripened a large and fine crop of fruit, which was almost free from rot. Enough *Læstadia* could be found for specimens, and the same was true for *Peronospora viticola*, but neither did any injury.

In Delaware there was also a long drouth in midsummer and black rot was not seriously destructive.

VINE BLIGHT.§

In good soil in one corner of a fine bearing vineyard near Griffin, Ga., twenty-five or thirty thrifty vines suddenly sickened in midsummer and

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***Bacillus amylovorus*, (Burrill) Trev.

† *Entomosporium maculatum*, Lév.

‡ *Læstadia Bidwelli*, (Ell.) V. and R.

§Later this blight was attributed to lightning, by the owner and others, who said lightning had also caused a similar appearance in the cotton fields.

died, in whole or part, in course of a few weeks, without apparent cause. The foliage lost color and wilted, the clusters shriveled, and the canes turned black. No fungous or insect enemies could be seen.

The vines were trained up on stakes and the vineyard had received proper care and cultivation. The soil was well drained upland. The cases were not all in one spot, but scattered about. The malady in its sudden appearance and destructive nature called to mind the mysterious vine disease of California, but did not agree with it in all particulars. At my suggestion the vines were promptly removed and destroyed.

BROWN ROT OF THE PEACH.*

Owing to the phenomenal scarcity of stone fruits in peach districts east of the Mississippi, this fungus was rare, except on old fruits. I saw it once at Lansing, Mich., on nascent plum shoots, but not elsewhere.

PEACH YELLOWS.

In southwestern Michigan there was an increase of the disease around Fennville, but not elsewhere, so far as I could hear or observe.

On the Delaware and Chesapeake peninsula this disease was worse than any previous year. The marked diminution of new cases in 1889 was coincident with a partial failure of the crop. It therefore seemed possible that here might be a clue to the cause of the disease. This year, however, with an entire failure of the crop the number of new cases were in excess of those in 1886, 1887, or even 1888, when the orchards bore most abundantly. Fruit or no fruit, the disease increases.

The cases by years in four representative Delaware orchards (my own count) are as follows:

Year.	Weather in summer.	Cases.			
		30 acres set in 1882.	10 acres set in 1885.	2 acres set in 1884.	10 acres set in 1884.
1887	Wet	*260	†32	†36	†27
1888	Dry	314	71	47	54
1889	Wet	255	63	6	37
1890	Dry	856	118	90	87

* A very few cases belong to 1886 when the disease first appeared. † First cases.

THE PEACH ROSETTE.

A new peach disease, or an old one in a new form, has made its appearance in Georgia and Kansas and bids fair to become very serious. One Kansas orchard was destroyed in two years, and certain Georgia orchards have suffered almost as badly. In some particulars this disease is identical with peach yellows; in others it differs somewhat. The disease occurs also in plums, wild and cultivated, and is equally destructive. A full account is reserved for separate consideration.

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* *Monilia fructigena*, P.